

WHAT IS CLAIMED IS:

1. In a fuel cell system comprising a reformer to produce a hydrogen containing gas for use in a fuel cell stack, the improvement comprising:

feeding to the reformer, at start-up, an emulsion composition comprising,

- at least 40wt% of hydrocarbon,

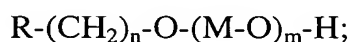
- from 30 to 60wt% of water, and

- from 0.01 to 5 wt% of a surfactant mixture comprising at least one surfactant from each of two types of surfactants, one type of surfactant comprising

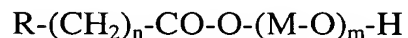
surfactants selected from the group consisting of alkoxyated alkyl alcohols,

alkoxyated alkyl monoesters and alkoxyated alkyl diesters and the other type of surfactant comprising surfactants selected from ethoxyated alkyl amids,

said alkoxyated alkyl alcohols represented by the formula,



said alkoxyated alkyl monoesters represented by the formula,



said alkoxyated alkyl diesters represented by the formula,



where R is a methyl group, n is an integer from about 5 to 17, m is an integer

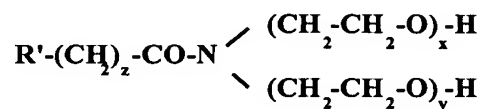
from about 2 to 50, M is CH_2-CH_2 , $CH_2-CH_2-CH_2$, $CH_2-CH-CH_3$,

$CH_2-CH_2-CH_2-CH_2$, $CH_2-CH-(CH_3)-CH_2$ or mixtures thereof,

and, said ethoxylated alkyl amids represented by the general formula,

where R' is a methyl group, z is an integer 5 to 20 and x+y is 2 to 50.

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2. The improvement of claim 1 wherein the emulsion further comprises up to 20 wt% alcohol based on the total weight of the said emulsion wherein said alcohol is selected from the group consisting of methanol, ethanol, n-propanol, iso-propanol, n-butanol, sec-butyl alcohol, tertiary butyl alcohol, n-pentanol, ethylene glycol, propylene glycol, butyleneglycol and mixtures thereof.

3. The improvement of claim 1 wherein said hydrocarbon is in the boiling range of - 1°C to 260°C

4. The improvement of claim 1 wherein said water is substantially free of salts of halides, sulfates and carbonates of Group I and Group II elements of the long form of The Periodic Table of Elements.

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5. The improvement of claim 1 wherein the emulsion is a complex water-in-oil-in-water emulsion.

6. The improvement of claim 1 wherein said alkoxyated alkyl alcohols, alkoxyated alkyl monoesters, alkoxyated alkyl diesters and ethoxylated alkyl amid surfactants thermally decompose at temperatures in the range of about 250°C to about 700°C.

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7. The improvement of claim 1 wherein in said alkoxyated alkyl alcohols, alkoxyated alkyl monoesters, alkoxyated alkyl diesters the alkoxyated group is an ethoxyated group.

5 8. A method to prepare a complex water-in-oil-in-water emulsion comprising mixing at mixing energy in the range of 0.15×10^{-5} to 0.15×10^{-3} kW/liter of fluid,

- at least 40wt% of hydrocarbon ,

10 - from 30 to 60wt% of water, and

- from 0.01 to 5 wt% of a surfactant mixture comprising at least one surfactant from each of two types of surfactants, one type of surfactant comprising
15 surfactants selected from the group consisting of alkoxyated alkyl alcohols, alkoxyated alkyl monoesters and alkoxyated alkyl diesters and the other type of surfactant comprising surfactants selected from ethoxyated alkyl amids, said alkoxyated alkyl alcohols represented by the formula,

20 $R-(CH_2)_n-O-(M-O)_m-H$;

said alkoxyated alkyl monoesters represented by the formula,

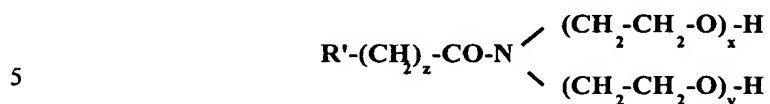
$R-(CH_2)_n-CO-O-(M-O)_m-H$

25 said alkoxyated alkyl diesters represented by the formula,

$R-(CH_2)_n-CO-O-(M-O)_m-CO-(CH_2)_n-R$

30 where R is a methyl group, n is an integer from about 5 to 17, m is an integer from about 2 to 50, M is CH_2-CH_2 , $CH_2-CH_2-CH_2$, $CH_2-CH-CH_3$,

CH₂-CH₂-CH₂-CH₂, CH₂-CH-(CH₃)-CH₂ or mixtures thereof,
and, said ethoxylated alkyl amids represented by the general formula,



where R' is a methyl group, z is an integer 5 to 20 and x+y is 2 to 50.

9. The method of claim 8 wherein mixing is conducted by an in-line mixer, static paddle mixer, sonicator or combinations thereof.

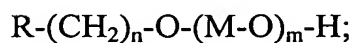
10. The method of claim 8 wherein said mixing is conducted for a time period in the range of 1 second to about 15 minutes.

11. A complex water-in-oil-in-water emulsion comprising,

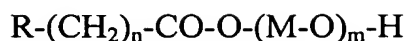
- at least 40wt% of hydrocarbon,

- from 30 to 60wt% of water, and

- from 0.01 to 5 wt% of a surfactant mixture comprising at least one surfactant from each of two types of surfactants, one type of surfactant comprising surfactants selected from the group consisting of alkoxyated alkyl alcohols, alkoxyated alkyl monoesters and alkoxyated alkyl diesters and the other type of surfactant comprising surfactants selected from ethoxylated alkyl amids, said alkoxyated alkyl alcohols represented by the formula,



said alkoxyated alkyl monoesters represented by the formula,

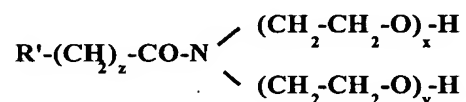


said alkoxyated alkyl diesters represented by the formula,



- 5 where R is a methyl group, n is an integer from about 5 to 17, m is an integer from about 2 to 50, M is CH_2-CH_2 , $CH_2-CH_2-CH_2$, $CH_2-CH-CH_3$, $CH_2-CH_2-CH_2-CH_2$, $CH_2-CH-(CH_3)-CH_2$ or mixtures thereof, and, said ethoxylated alkyl amids represented by the general formula, where R' is a methyl group, z is an integer 5 to 20 and x+y is 2 to 50.

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12. The complex water-in-oil-in-water emulsion of claim 11 further comprising up to 20 wt% alcohol based on the total weight of the said emulsion
15 wherein said alcohol is selected from the group consisting of methanol, ethanol, n-propanol, iso-propanol, n-butanol, sec-butyl alcohol, tertiary butyl alcohol, n-pentanol, ethylene glycol, propylene glycol, butyleneglycol and mixtures thereof.

- 20 13. The composition of claim 11 wherein in said alkoxyated alkyl alcohols, alkoxyated alkyl monoesters and alkoxyated alkyl diesters the alkoxyated group are an ethoxylated group.

14. The complex water-in-oil-in-water emulsion of claim 11
25 wherein said emulsion has conductivity in the range of 20 to 40 mhos at 25°C.

15. The complex water-in-oil-in-water emulsion of claim 11 wherein said emulsion is stable to freeze thaw cycles in the temperature range of -54°C to +50°C